Feedstock Considerations for Commercial Facilities and the Gainesville 100MW Biomass Plant

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Oak Ridge, TN

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Gainesville, FL
BioResource Management, Inc. (BRM)

• Based in Gainesville, FL.
• Specializes in procurement of biomass for energy.
• Over forty years’ experience
• Staff includes certified foresters and environmental scientists.
• Members Florida Forestry Association and the Society of American Foresters.
BRM has helped developed, started up and supplied biomass for many facilities since 1982

- Fuel Supply Development, 7.5 MW biomass plant, FL.
- Delivery of 25,000 tons per year to FL state prison.
- Start-up of 40MW biomass plant in FL, delivery of 150,000 tons annually.
- Develop/start-up 74.9 MW biomass power plant in Florida, delivery of over 350,000 tons per year.
- Start-up 17.8 MW biomass power plant in MA, delivery of 180,000 tons per year.
- Develop/start-up 18.0 MW biomass power plant in NY, delivery of 160,000 tons per year.
- Delivery of 100,000 tons of biomass fuel per year in GA and FL.
- Developing dedicated energy crops for new biofuels facilities in LA, FL, TX.
In June 2011 BRM was awarded the long-term contract to manage all biomass for the Gainesville Renewable Energy Center (GREC) 100 MW biomass power facility in Gainesville, FL.
GAINESVILLE RENEWABLE ENERGY CENTER (GREC) PROJECT OVERVIEW

- 116 MW gross, 100 MW net biomass-fueled power generation facility.
- Facility will use 575,000 dry tons (about 1,000,000 green tons) annually.
- Will use urban wood waste, wastes from logging, and mill residues.
- GREC will be operational in Fall 2013. Total investment of approximately $500 million
GREC POWER BLOCK (MARCH 2012)
GREC VIEW OF POWER BLOCK FROM SE (OCTOBER 2012)
GREC General Arrangement
GREC-GENERAL TIMELINES

• General Construction- March 2011- June 2013
• Wood yard complete and initial wood deliveries- April-May 2013
• Initial generation of power- 3rd quarter 2013
• Full commercial operation- 4th Quarter 2013
GREC FUEL SUPPLY

• BRM under contract to provide fuel procurement and management services
• 40 - 50% urban wood, remainder from forests and mill residues
• All wood processed (size reduction) off-site
• Biomass purchased on a dry-ton basis
Over 6 million tons of Potential Biomass Feedstock Generated in GREC Supply Area

- GREC’s demand for biomass fuel is approximately 1 million tons/yr.
- Data indicate that biomass generation within the GREC supply area exceeds 6 million tons/yr, summarized in the table below.

<table>
<thead>
<tr>
<th>Material</th>
<th>Generated in supply area (green tons/yr)</th>
<th>Target procurement volume for GREC (green tons/yr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban wood waste</td>
<td>930,000*</td>
<td>375,000-425,000</td>
</tr>
<tr>
<td>Forest-derived biomass</td>
<td></td>
<td></td>
</tr>
<tr>
<td>First thinnings</td>
<td>540,000</td>
<td>150,000-200,000</td>
</tr>
<tr>
<td>Logging residue</td>
<td>1,600,000</td>
<td>175,000-200,000</td>
</tr>
<tr>
<td>Mill residue</td>
<td>3,300,000</td>
<td>150,000-250,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>6,370,000</strong></td>
<td><strong>1,000,000</strong></td>
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</tbody>
</table>

* Urban wood has larger supply shed than other sources
Urban Wood

- Major generators in supply area
  - Municipalities & counties (yard waste)
  - Tree services / landscapers
  - Landclearing

- End products include boiler fuel and mulch, but much disposed of (burned, land applied) legally or illegally.

- GREC has firm commitments for at least 40% of its total requirements from urban wood sources.
Forestry Wood

- Logging residue
- Thinnings
- Nonmerchantable species/timber
- Understory
- Potentially SRWC
FOREST-SOURCED BIOMASS

• Subject to **Minimum Sustainability Standards** (MSS) built into PPA:
  – Silviculture BMP compliance, compliance with state flora/fauna protection acts
  – Chain of custody documentation
  – Professional forester engaged by supplier to affirm MSS compliance
  – Landowners required to replant harvested tracts within 3 years
  – Suppliers attend annual sustainability & BMP seminar
FOREST-SOURCED BIOMASS

- MSS continued:
  - No stumps except under special conditions
  - No *invasive* non-native material except as part of eradication/restoration
  - No biomass from conversion of natural forests to plantation forests
  - Annual 3\textsuperscript{rd} party audits of compliance
FOREST-SOURCED BIOMASS

- **Forest Stewardship Incentive Payments (FSIP)**
  - Financial incentive to go beyond practices outlined in MSS
  - Upon verification, price premium for 3rd party certified tracts
  - FSC and FFS Stewardship Program qualify for FSIP premiums ($1 and $0.50/as-received ton, respectively)
  - FSIP paid directly to landowner
**Supporters & Approving Agencies**

*GREC has received overwhelming support from a variety of groups and interests:*

<table>
<thead>
<tr>
<th>Environmental</th>
<th>Forestry</th>
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<tbody>
<tr>
<td>Florida Wildlife Federation</td>
<td>Florida Forestry Association</td>
</tr>
<tr>
<td>Southern Alliance for Clean Energy</td>
<td>Florida Farm Bureau Federation</td>
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<tr>
<td></td>
<td>Forest Landowners Association</td>
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</tbody>
</table>

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<tr>
<th>Power</th>
<th>Economic</th>
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</thead>
<tbody>
<tr>
<td>Florida Municipal Electric Association</td>
<td>Gainesville Area Chamber of Commerce</td>
</tr>
<tr>
<td>Florida Public Service Commission</td>
<td>FloridaWorks</td>
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</table>

<table>
<thead>
<tr>
<th>Governmental</th>
<th>More Governmental</th>
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</thead>
<tbody>
<tr>
<td>Alachua County Legislative Delegation</td>
<td>North Central Florida Renewable Resource Conservation &amp; Development Council</td>
</tr>
<tr>
<td>Gainesville City Commissioners</td>
<td>North Central Florida Regional Planning Council</td>
</tr>
<tr>
<td>Florida Department of Agriculture &amp; Consumer Services</td>
<td>Suwannee River Water Management District</td>
</tr>
<tr>
<td>Florida Department of Health</td>
<td>City of Gainesville</td>
</tr>
<tr>
<td>Florida Department of Community Affairs</td>
<td>Alachua County</td>
</tr>
<tr>
<td>Florida Department of State</td>
<td>US Corps of Engineers</td>
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<tr>
<td>Florida Department of Transportation</td>
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</tbody>
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Procuring Woody Biomass for thirty years—perspectives of both a buyer and a seller

- General contracting terms
- Buying fuel by the dry ton
- Compromise versus consensus
Contracting for Biomass Supplies

• Buy at the lowest price, but there is no benefit from having an economically weak supplier.
• Terms are probably the life of the chipper for producers (5 years), perhaps longer for landowners, shorter for brokers.
• Put-or-pay, take-or-pay provisions cut both ways.
• Remedies for default should be generally equally burdensome.
Units of measure

• As-received weight (green tons) works for some industries, but doesn’t capture potential benefits for efficiency.

• Purchasing by the dry ton helps to ultimately capture actual value of the feedstock. Dry tons ash-free works even better.

• Actually, combustion facilities want to buy BTUs, biofuels facilities want to buy usable carbohydrates.
Moisture Content has large impact for Buyer

<table>
<thead>
<tr>
<th>Moisture Content</th>
<th>Btu Wood</th>
<th>Btu Water</th>
<th>Net BTU Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>50%</td>
<td>4,250</td>
<td>(600)</td>
<td>3,650</td>
</tr>
<tr>
<td>47%</td>
<td>4,505</td>
<td>(564)</td>
<td>3,941</td>
</tr>
<tr>
<td>44%</td>
<td>4,760</td>
<td>(528)</td>
<td>4,232</td>
</tr>
<tr>
<td>41%</td>
<td>5,015</td>
<td>(492)</td>
<td>4,523</td>
</tr>
<tr>
<td>38%</td>
<td>5,270</td>
<td>(456)</td>
<td>4,814</td>
</tr>
<tr>
<td>35%</td>
<td>5,525</td>
<td>(420)</td>
<td>5,105</td>
</tr>
<tr>
<td>32%</td>
<td>5,780</td>
<td>(384)</td>
<td>5,396</td>
</tr>
</tbody>
</table>

Reducing the moisture content from 50% to 32% is a weight loss of 18%, but an increase in BTU value of 40%.
<table>
<thead>
<tr>
<th>Moisture Content</th>
<th>Dry Tons per Load</th>
<th>Value per Load</th>
<th>Transport Cost/Dry Ton</th>
</tr>
</thead>
<tbody>
<tr>
<td>50%</td>
<td>14.00</td>
<td>$560.00</td>
<td>$16.80</td>
</tr>
<tr>
<td>45%</td>
<td>15.40</td>
<td>$616.00</td>
<td>$15.27</td>
</tr>
<tr>
<td>40%</td>
<td>16.80</td>
<td>$672.00</td>
<td>$14.00</td>
</tr>
<tr>
<td>35%</td>
<td>18.20</td>
<td>$728.00</td>
<td>$12.92</td>
</tr>
<tr>
<td>33%</td>
<td>18.76</td>
<td>$750.40</td>
<td>$12.54</td>
</tr>
<tr>
<td>31%</td>
<td>19.32</td>
<td>$772.80</td>
<td>$12.17</td>
</tr>
<tr>
<td>29%</td>
<td>19.88</td>
<td>$795.20</td>
<td>$11.83</td>
</tr>
<tr>
<td>27%</td>
<td>20.44</td>
<td>$817.60</td>
<td>$11.51</td>
</tr>
<tr>
<td>25%</td>
<td>21.00</td>
<td>$840.00</td>
<td>$11.20</td>
</tr>
</tbody>
</table>

The producer can capture more value per truckload, and they realize it.

Using a selling price of $40.00 per dry ton, $.14 per mile haul cost for a 60 mile haul, and a 28 ton load, a producer can gain a value of $168.00 per load by delivering at 35% MC instead of 50%.
Compromise and Consensus—
“Richard’s Theorems”

1. You can’t make everyone happy—don’t try.

2. Be able to recognize differences between concessions and fatal flaws.

3. A project that reaches consensus through compromise, but in the process becomes unachievable, hurts everyone.

4. Keep the faith!
THE END
Thanks for Staying!

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